

**PATENT**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Application No.: 10/572,894

Examiner: Christopher S. Bobish

Applicants: Ian David Stones et al.

Art Unit: 3746

Title: VACUUM PUMP

Confirmation No.: 1336

Filed: March 20, 2006

Atty. Docket No.: M03B354

Commissioner for Patents  
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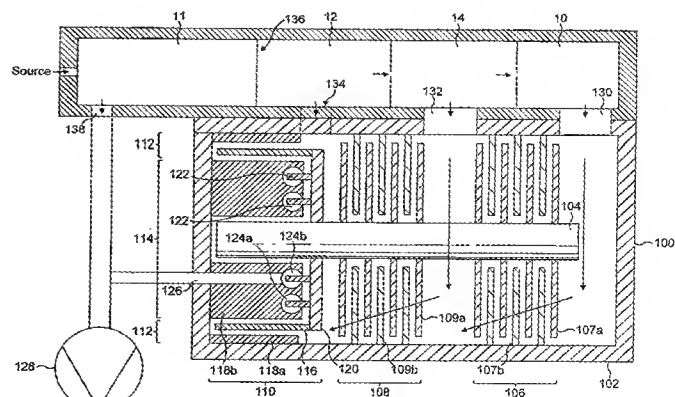
**PRE-APPEAL BRIEF REQUEST FOR REVIEW**

Dear Sir/Madam:

Applicants appeal the final rejections of claims 1, 3-29, 31-42, and 45-59. Independent claim 55 is rejected under 35 USC 103(a) as being unpatentable over EP Patent Application Publication No. 0,959,253 to Stones (hereinafter referred to as "Stones"). Independent claims 1, 29, and 42 are rejected under 35 USC 103(a) as being unpatentable over Stones in view of US Patent No. 5,020,969 to Mase et al. (hereinafter referred to as "Mase"). Dependent claims 3-28, 31-41, 45-54, and 56-59 are rejected over Stones in view of Mase and other references under 35 USC 103(a).

**BACKGROUND**

This invention is directed to an improved vacuum pump and an impeller thereof. As described in claim 1, the exemplar vacuum pump comprises a molecular drag pumping mechanism (e.g., 112) and, downstream therefrom, a regenerative pumping



mechanism (e.g., 114), wherein a rotor element of the molecular drag pumping mechanism (e.g., 116) **surrounds** rotor elements of the regenerative pumping mechanism (e.g., 122), wherein the rotor element of the molecular drag pumping mechanism comprises a cylinder mounted for rotary movement with the rotor elements of the regenerative pumping mechanism. Claim 1 with reference to FIG. 2 of the specification clearly shows that the rotor element of the molecular drag pumping mechanism and the rotor elements of the regenerative pumping mechanism are **two separate parts**, instead of an integral, single-piece structure.

## ISSUES

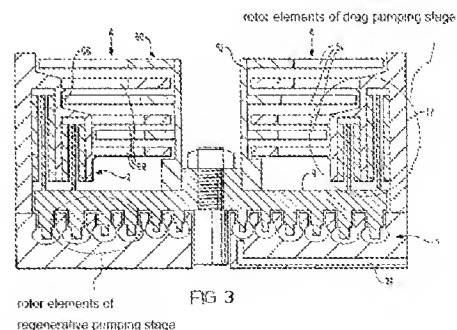
- I. Whether Examiner errs in asserting that it is obvious to modify Stones into surrounding the rotor elements of the regenerative pumping mechanism with the rotor elements of the molecular drag pumping mechanism.
- II. Whether Examiner errs in asserting that it is obvious to modify Mase in view of Stones to make blades 55A and impeller 51A into two separate pieces of structure.

## DISCUSSION

I. **Examiner errs in asserting that it is obvious to modify Stones by surrounding the rotor elements of the regenerative pumping mechanism with the rotor elements of the molecular drag pumping mechanism.**

A. *In Stones, the rotor elements of the regenerative pumping mechanism and the rotor elements of the molecular drag pumping mechanism are on opposite sides of a mounting plate.*

As shown in FIG. 3 of Stones, the rotor elements of drag pumping mechanism and the rotor elements of regenerative pumping mechanism are on opposite sides of a mounting plate. This differs from the claimed invention where the rotor elements of the molecular drag pumping mechanism **surround** the rotor elements of the regenerative pumping mechanism.



- B. *Rearrangement of parts is not per se obvious.*

Examiner cites In re Japikes, 181 F.2d 1019 (CCPA 1950), and asserts that rearranging of parts of an invention involves only routine skill in the art. *See, the Final Office Action, page 4, lines 7-9.* However, Applicants respectfully submit that the mere fact that a worker in the art could rearrange the parts of the reference device to meet the terms of claims is not by itself sufficient to support a finding of obviousness. *Ex parte Chicago Rawhide Mfg. Co.*, 223 USPQ 351, 353 (Bd. Pat. App. & Inter. 1984). The prior art must provide a motivation or reason for the worker in the art, without the benefit of appellant's specification, to make the necessary changes in the reference device. *Id.*

C. *Stones teaches away from surrounding the rotor elements of the regenerative pumping mechanism with the rotor elements of the drag pumping mechanism.*

An objective of Stones is to make efficient use of space in a compound vacuum pump. *See, paragraph [0005].* In order to achieve the objective, Stones teaches a pump where "the hub diameters are kept substantially the same and the tip diameters of the rotor vanes are reduced." *See, paragraph [0027].* Such stepped design enables the rotor vane 54 at the inlet to achieve high speed, while creating space to accommodate other part as the vanes shorten away from the inlet. *See, paragraph [0026].* If the rotor elements of the drag pumping mechanism 2 were to surround the rotor elements of the regenerative pumping mechanism 1, the space created by the shortened rotor vanes 54 would have been wasted. Such modification is inefficient in use of space.

If the proposed modification renders the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or modification to make the proposed modification. *In re Gordon*, 733 F.2d 900 (Fed. Cir. 1984). Since modifying Stones by surrounding the rotor elements of the regenerative pumping mechanism with the rotor elements of the drag pumping mechanism would defeat its intended purpose of space efficiency, there is no suggestion or motivation to make such modification, notwithstanding that the modification can be categorized as a rearrangement of parts. As such, Applicants respectfully submit that it would not have been obvious for a person skilled in the art to make such modification.

**II. Examiner errs in asserting that it is obvious to modify Mase in view of Stones by making blades 55A and impeller 51A into two separate parts.**

*A. Mase fails to teach that the rotor elements of the regenerative pumping mechanism and the rotor elements of the drag pumping mechanism are two separate parts.*

As shown in FIG. 11 of Mase, impeller 51A (compared to the claimed rotor elements of the molecular drag pumping mechanism) and blades 55A (compared to the claimed rotor elements of the regenerative pumping mechanism) are made of a single, integral structure. Mase teaches integral molding as the manufacturing technique for manufacturing the impeller. *See, col. 3, lines 40-44.* It implies that the blades are made part of the impeller during the molding process.

*B. Mase teaches away from making impeller 51A and blades 55A into two separate pieces of structure.*

Mase criticizes conventional turbo vacuum pumps in which the impeller and the fixing plate are made into two separate pieces for their difficulty in maintaining processing accuracy due to complex construction. *See, col. 1, lines 14-29.* It is therefore an objective of Mase to provide a turbo vacuum pump whose production and dimensional control are facilitated so that variations in pump performance due to various factors of a production process can be minimized. *See, col. 1, lines 60-64.* Mase points out that the gas leakage between the impeller and the stator causes the pump performance to deteriorate. *See, col. 4, lines 6-11.* It implies that the locations of the blades relative to the stator need to be properly controlled in order to avoid gas leakage and ensure the desired pump performance.

Making impeller 51A and blades 55A in a single-piece of structure by integral molding as suggested by Mase provides dimensional accuracy, simplicity of assembly, and consistency in mass production. Although, in theory, the impeller 51A and blades 55A can be made into two separate parts and then put together during assembly, it would not be practical because it would be difficult to keep dimensional accuracy for all the blades 55A mounted to various steps of the impeller 51A, complex in manufacturing and assembly, and susceptible to inconsistency in mass production.

*C. It would not have been obvious for a person skilled in the art to modify Mase's impeller 51A and blades 55A in two separate pieces in view of Stones.*

Examiner asserts that Stones teaches the non-integral feature of the claimed invention, and that it would have been obvious for a person skilled in the art to modify Mase's impeller 51A and blades 55A in two separate pieces of structure in view of Stones. *See, the Final Office Action, page 19, line 10 – page 20, line 3.* However, for the reasons discussed above, Applicants respectfully submit that Mase teaches away from the non-integral feature and therefore Mase and Stones cannot be combined under the established legal precedent. Mase, standing alone, fails to teach each the non-integral feature of the claimed invention. Stones, standing alone, fails to teach the rotor elements of drag pumping stage mechanism surrounding the rotor elements of regenerative pumping mechanism. Thus, the claimed invention is patentable over the Mase or Stones under 35 USC 103(a).

## CONCLUSION

For the reasons discussed above, Applicants respectfully submit that independent claims 1, 29, 42, and 55 are patentable over the cited references under 35 USC 103(a), and claims 3-28, 31-41, 45-54, and 56-59 are also patentable due to their dependency on the independent claims. As such, Applicants respectfully request that the rejections be reversed and all pending claims allowed.

Respectfully submitted,

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